CASE REPORT

Role of Vitamin D in schizophrenia in elderly patient

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ABSTRACT

Vitamin D deficiency is common in the patient with mental illness such as schizophrenia; several environmental risk factors for schizophrenia, such as season of birth, latitude, and migration, have been linked to Vitamin D deficiency. Recent studies have suggested a potential role of Vitamin D in the development of schizophrenia, for example, neonatal Vitamin D status is associated with the risk of developing schizophrenia in later life. Here, we report a case of Vitamin D deficiency presenting with schizophrenia. Vitamin D supplementation is promising treatment strategy to prevent relapse to improve psychotic symptoms, and physical health in patients with schizophrenia should be further explored in future studies.

Key words: Neurosteroid, schizophrenia, sunshine vitamin, Vitamin D

INTRODUCTION

Vitamin D is potent neurosteroid hormone, critical to brain development, and normal brain function. Vitamin D deficiency is common in the patient with severe mental illness such as schizophrenia. It has been recently reported that low Vitamin D levels were associated with increased grandiosity, excitement, social anhedonia, and irregular speech among patients with schizophrenia.[1] Around 65% of patients with schizophrenia had Vitamin D deficiency, according to the researchers. In detail study, they also found that Vitamin D level in participants with schizophrenia was 5.91 ng/ml lower than those of healthy participants. Psychogeriatric patients may be at risk for Vitamin D deficiency due to their age, less exposure to sunlight, and less dietary intake, and such patients have more chronic medical illness. However, there is little knowledge regarding the actual Vitamin D status in this group of patients. It is possible that older individuals with psychiatric disorder having a less intake of diet and lack of outdoor activity that may result in Vitamin D deficiency. It is well known that a diversity of psychiatric symptoms can also occur due to various medical conditions. Some patients with thyrotoxicosis develop depression, other anxiety, or psychosis, and some do not develop psychiatric disorders at all.[2] The same pattern is found in patients with hyperparathyroidism[3] and in patients with low levels of Vitamin B12.[4] Potential benefits of Vitamin D supplementation are to improve schizophrenia symptoms as well as physical health in patients with schizophrenia. Vitamin D is also known as "sunshine vitamin" and is widely known for its essential role in calcium absorption and bone health.[5] Vitamin D obtained through ultraviolet B (UVB) light; dietary sources, such as fatty fish, fungus, and eggs, naturally contain a high level of Vitamin D. Cereal, milk, and other everyday foods are fortified with Vitamin D also available as a dietary pill. Vitamin D deficiency has become a global pandemic.[5,6]

It has been hypothesized that Vitamin D plays a role in season of birth effect as the UVB rays required to make Vitamin D are reduced or not available in the months most associated with an increase in the birth of individuals at the risk of schizophrenia.[7] Increased incidence rate of schizophrenia was seen at higher latitude.[8] Individual at higher latitudes tends to receive substantially less Vitamin D than individuals at lower latitudes.[8] The shorter day lengths and less intense sunlight that individuals receive at higher latitudes decrease an individual Vitamin D intake. It has been reported that schizophrenia is 3 times more likely to occur in migrants than in native-born participants.[9] The individual migrating from a warmer to a colder climate receives less Vitamin D.[5]

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CASE REPORT

A 60-year-old, married male patient has been in psychiatric hospital, Taif, in chronic rehabilitation ward for the past 20 years. He was diagnosed with schizophrenia 25 years back for his disturbed behavior such as positive symptoms such as suspiciousness, hearing voices, anger outburst, irrelevant talk, and negative symptoms such as emotional blunting, apathy as well as cognitive impairment. He was on multiple antipsychotics but was stable on olanzapine 20 mg/day last 4 years.

Since the past 1 year, despite being compliant and on a stable dose of olanzapine 20 mg, he started to become more suspicious, agitated, hearing voices, irrelevant talk, and sometime grandiose ideas, and this required addition of amisulpride 400 mg to the previous antipsychotic regimen along with occasional use of injectable haloperidol and benztropine to manage agitated behavior. No history suggested noncompliance with medications. In spite of increasing and switching to other antipsychotics, he was never achieved normal level. There was no family history of psychiatric illness or any history of drug abuse. He did not have any history of diabetes and cardiovascular disease, but he had hyperuricemia and hyperlipidemia, so he was on zyloric acid 100 mg/day and simvastatin 20 mg/day, respectively.

His further history revealed that birth milestone achieved normal and he was born in winter season. He was residing at higher altitude, Taif a hill station. His father migrated from Makkah to Taif, it means from warmer to a colder climate. His routine laboratory investigation findings include a complete blood cell count and all chemistry within normal range and only his uric acid level was 6 mg/dl, Hb was 19.2 g/dl, and cholesterol was 250 mg/dl; after consultation of physician, we continued his zyloric acid and simvastatin and did venesection for his polycythemia. Vitamin D level also done it comes 15.59 nmol/l and started Vitamin D3 supplementation 60,000 IU/week for 3 months after consultation of physician along with we continued his psychiatric medication olanzapine and amisulpride. We have referred him to our clinical psychologist for his psychosocial treatment such as social skill training, family psychoeducation, cognitive behavior therapy (e.g., rational analysis) to reduce distress associated with both hallucinations and delusions, and cognitive rehabilitation to increase memory capacity, attention, and high-level problem-solving skills. There was dramatic improvement in his psychiatric symptoms after 3 months and Vitamin D within normal level. We tapered amisulpride, stopped within 1 month, and continued olanzapine 20 mg/day; there was complete resolution of psychotic symptoms. Brief Psychiatric Rating Scale was used to rate psychopathology which initially had a score of 80, and it reduced to 21 following supplementation with Vitamin D.

DISCUSSION

The patient presented with disturbances of psychiatric symptom for 1 year, in spite of increasing or switching to other antipsychotics. In the absence of genetic vulnerability factors, this patient's illness could be thought of as having a strong association with Vitamin D deficiency. The risk factors such as season of birth, latitude, and migration might have played significant role to Vitamin D deficiency[9,10] as our patient is born in winter; it has been hypothesized that Vitamin D plays a role in the season-of-birth effect as the UVB rays required to make Vitamin D are reduced or not available, so neonatal Vitamin D status is associated with risk of developing schizophrenia in later life. There also seems to be a relationship between the risk of schizophrenia and latitude, with an increased incidence rate of schizophrenia seen at higher latitude; higher latitudes tend to receive substantially less Vitamin D than individuals at lower latitudes; furthermore, at latitudes above 35°, the UVB rays required to make Vitamin D are not available during the winter months. The shorter day lengths and less intense sunlight that individuals receive at higher latitudes decrease an individual's Vitamin D intake. It has been reported that schizophrenia is 3 times more likely to occur in immigrants than in native-born participants. Thus, an individual migrating from a warmer to a colder climate receives less Vitamin D, and our patient migrated from warmer climate Makkah to colder climate Taif which is on high altitude and is a hill station. Risk factors for Vitamin D deficiency include darker skin, lack of adequate sun exposure, autoimmune diseases, influenza, old age, and the use of certain medicines such as anticonvulsants. Vitamin D is likely to play an important role in the management and prevention of various mental health problems.

Studies have identified links between Vitamin D and multiple diseases including various cancers, autoimmune disease, cardiovascular disease, infectious disease, insulin resistance, diabetes, hyperlipidemia, and mental disorders. It has been shown that patients with psychiatric illness are much more likely to be Vitamin D deficiency than general population.[11] In mental health, Vitamin D deficiency is associated with schizophrenia, depression, anxiety, and Alzheimer's disease among others. Schizophrenia, in particular, more likely to be deficient than with other psychiatric disorders.[12] Many studies suggest that patients with schizophrenia or other psychotic disorders could potentially benefit from Vitamin D supplementation. Vitamin D supplementation during the 1st year of life was associated with reduced risk of schizophrenia in male participants.[13] Low concentration of the 25-hydroxy Vitamin D3 (25OHD) in neonates was associated with a 2-fold increased risk of developing schizophrenia in later life.[14] Most recent mini-meta analysis schizophrenic patients have been found to have lower serum level of Vitamin D than healthy control.[12]

Vitamin D deficiency results in abnormal calcification or mineralization of the bone and reduced bone density with some reports of increased risk for fractures and cognitive impairment. The role of immune dysfunction and inflammation has been described in patients with schizophrenia.[15] According to several studies suggested that the regulation of inflammatory and immunological processes is most likely related to the manifestation of symptoms and treatment response of schizophrenia, also elevated blood level of C-reactive protein or white cell count is associated with a worse psychopathology profile in patients with schizophrenia;[16,17] therefore, Vitamin D supplementation might be a promising treatment strategy for schizophrenia.

Vitamin D plays an active role in the normal development and function of multiple body organ systems including the brain. Vitamin D deficiency remains a widespread problem in patients with schizophrenia. Vitamin D plays a significant role in the neurodevelopmental process, physical health, and mental health. In our case study, the patient had decreased appetite due to old age which could have been one of the factors of nutritional deficiency and chronic illness. It is risk factors for the development of Vitamin D deficiency. The most common nutritional deficiency observed in mental disorder of geriatric patients is of omega-3 fatty acids, B vitamins, minerals, and amino acids that are precursors to neurotransmitters.[18,19] Nonpharmacological management such as nutritional therapy could be adopted by food containing natural Vitamin D sources such as salmon, mackerel, and cod liver oil and other dietary sources such as fatty fish, fungus, and eggs. Cereal, milk, and other everyday foods are fortified with Vitamin D should be given to the patient and which can help to the patient to the correct the nutritional deficiency. Psychiatrists treating patients with mental disorders should be aware of available nutritional therapies, appropriate doses, and possible side effects to provide alternative and complementary treatments for their patients. The level of 25OHD is used to evaluate Vitamin D status. In Norway, >40% of the population have been reported to have serum 25OHD levels below 50 nmol/L.[20] Similarly, in Australia, India, and Saudi Arabia, 30%–50% of children, adults, and elderly patients have 25OHD levels below 50 nmol/l.[21-23] Therefore, our case findings are in concurrence with reported literature. Vitamin D plays a role in numerous brain processes including regulation of neurotrophic factors, neuroprotection, brain development, and neuroplasticity which might have a role to play in psychiatric diseases such as schizophrenia. Randomized placebo-controlled trial would also be needed to establish causation between Vitamin D deficiency and psychological illnesses. We suggest that increased attention should be given to Vitamin D deficiency in psychiatric disorders.

CONCLUSION

In this case report, there is evidence of a link between Vitamin D deficiency and schizophrenia. Due to Vitamin D deficiency, immunity of patients with schizophrenia decreased and symptoms get relapses; therefore, Vitamin D supplementation might be a promising treatment strategy for schizophrenics. Potential benefit is of Vitamin D supplementation to improve schizophrenic symptoms, and physical health in patients with schizophrenia should be further explored in further studies. However, well-designed controlled clinical trials are needed to confirm our findings.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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